

REMARKS

Claims 1, 11, 12, 67 and 68 are amended. Claims 82 and 83 are cancelled. Claims 1-13 and 67-80 are pending in the application.

Claims 11, 12 and 68 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. The Examiner states that the claim language "comprising one or more" does not clearly set forth the metes and bounds of the invention with regards to the elements and compounds useful in the invention. The Examiner suggests using Markush language to overcome the § 112 rejection. Without admission as to the propriety of the Examiner's rejection, applicant has amended claims 11, 12 and 68 to recite Markush language as suggested. Accordingly, applicant respectfully requests withdrawal of the § 112 rejection of claims 11, 12 and 68 in the Examiner's next action.

Claims 1-4, 7-13, 67-69, 71-74, 77-80 and 83 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Dunlop, U.S. Patent No. 5,590,389. The Examiner is reminded by direction to MPEP § 2131 that anticipation requires each and every element of a claim to be disclosed within a single prior art reference. Each of claims 1-4, 7-13, 67-69, 71-74 and 77-80 are allowable over Dunlop for at least the reason that Dunlop fails to disclose each and every limitation in any of those claims.

Independent claim 1, as amended, recites a target comprising a material having an average grain size across a sputtering surface of less than or equal to about 30 microns, the material being formed by a process including casting, aging, and equal channel angular extrusion. The amendment to claim 1 is supported by the specification at, for example, page 11, lines 14-19; and page 11, line 27 through page 12, line 2. At page 6, paragraph 1

of the present action the Examiner states that Dunlop discloses that the material utilized may be originally from a cast material. The Examiner relies on the Dunlop disclosure at column 5, lines 6-8 to support this statement. The Examiner is mistaken.

Referring to Dunlop column 5, lines 1-17, Dunlop discusses and compares various conventional methods of obtaining targets utilizing methods such as casting or processing of powders. This paragraph of the Dunlop disclosure does not disclose utilizing cast materials for processing by the disclosed methods. Nor does the remaining Dunlop disclosure teach utilizing a cast material. Accordingly, Dunlop fails to teach each and every limitation of independent claim 1.

Contrary to statements made by the Examiner at page 6 of the present action, Dunlop does not suggest the claim 1 recited target comprising a material being formed by a process including casting. The Examiner states that since Dunlop discloses that the invention does not require material which has been processed by liquid dynamic compaction (LDC) for further processing by equal channel angular extrusion (ECAE) that the Dunlop methods may reasonably be expected to be practiced upon a cast material. Applicant disagrees.

Although Dunlop discloses that ECAE can be utilized independently of LDC, there is nothing in the Dunlop disclosure that suggests utilizing ECAE in conjunction with casting. First, LDC is one of a number of non-casting processes for forming materials. Second, the Dunlop disclosure specifically teaches utilization of ECAE with materials processed by LDC and repeatedly compares the advantages of LDC materials to properties of materials using casting methods (col. 5, ll. 63 through col. 6, ll. 2; col. 6, ll. 3-23; col. 2, ll. 50 through col. 3, ll. 10). No suggestion is made by the Dunlop reference to utilize cast material.

Additionally, as discussed in applicant's specification at, for example, page 11, lines 14-19 and page 26, lines 15-23, the recited casting and aging allows the material to have extremely fine and uniformly distributed precipitates which can enhance stability of microstructures formed by deformation. Accordingly, independent claim 1 is not rendered obvious by Dunlop.

Dependent claims 3-4 and 7-13 are allowable over Dunlop for at least the reason that they depend from allowable base claim 1.

With respect to independent claim 67, as amended such recites a target comprising a copper material formed by a process including casting. Independent claim 1 is allowable over Dunlop for at least reasons similar to those discussed above with respect to independent claim 1. Dependent claims 68-69, 71-74 and 77-80 are allowable over Dunlop for at least the reason that they depend from allowable base claim 67.

With respect to independent claim 83, without admission as to the propriety of the Examiner's rejection, claim 83 is cancelled.

Claims 5, 6, 75, 76 and 82 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Dunlop. As discussed above, Dunlop fails to disclose or suggest the claim 1 and claim 67 recited target comprising a material being formed by a process including casting. Accordingly, independent claims 1 and 67 are not rendered obvious by Dunlop and are allowable over this reference. Dependent claims 5, 6, 75 and 76 are allowable over Dunlop for at least the reason that they depend from corresponding allowable base claims 1 and 67.

With respect to independent claim 82, without admission as to the propriety of the Examiner's rejection, claim 82 is cancelled.

Claim 70 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Dunlop in view of Segal, U.S. Patent No. 6,238,494. As discussed above, independent claim 67 recites a target comprising a copper material being formed by a process including casting. Claim 67 further recites a predominant <220> crystallographic texture and precipitates present in the target having a maximum dimension of 0.5 microns. Segal discloses targets comprising fine and uniform structures and strong uniform textures (col. 6, lines 44-48). Segal does not disclose or suggest the claim 67 recited physical vapor deposition target having a predominate <220> crystallographic texture wherein any precipitate present has a maximum dimension of 0.5 micron. Further, Segal does not disclose or suggest the claim 67 recited target having a predominate <220> crystallographic texture comprising a material being formed by a process including casting. As combined, Dunlop and Segal fail to disclose or suggest the claim 67 recited target comprising a material being formed by a process including casting and having a predominate <220> crystallographic texture and precipitates having a maximum dimension of 0.5 micron. Accordingly, independent claim 67 is not rendered obvious by the combination of Segal and Dunlop. Dependent claim 70 is allowable over the cited combination of Dunlop and Segal for at least the reason that it depends from allowable base claim 67.

For the reasons discussed above claims 1-13 and 67-80 are allowable. Accordingly, applicant respectfully requests formal allowance of pending claims 1-13 and 67-80 in the Examiner's next action.

Respectfully submitted,

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Title: Physical Vapor Deposition Targets, and Methods of Fabricating Metallic Materials

VERSION WITH MARKINGS TO SHOW CHANGES MADE ACCOMPANYING  
RESPONSE TO SEPTEMBER 12, 2002 FINAL OFFICE ACTION

In the Claims

The claims have been amended as follows. Underlines indicate insertions and strikeouts indicate deletions.

1. (Amended) A physical vapor deposition target comprising a material with a face centered cubic unit cell, having a sputtering surface, and formed by a process comprising:

casting;

aging; and

equal channel angular extrusion; the target having

a predominate <220> crystallographic texture across the sputtering surface; and an average grain size across the sputtering surface of less than or equal to about 30 microns, the material being formed by a process including casting.

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11. (Amended) The physical vapor deposition target of claim 1 comprising ~~one or more~~ at least one element selected from the group consisting of aluminum, copper, silver, gold, nickel, brass, cerium, cobalt, calcium, iron, lead, palladium, platinum, rhodium, strontium, ytterbium, and thorium.

12. (Amended) The physical vapor deposition target of claim 1 comprising ~~one or more~~ at least one element selected from the group consisting of aluminum, copper, gold, nickel, and platinum.

67. (Amended) A physical vapor deposition target comprising a copper material with a face centered cubic unit cell, having a sputtering surface, and comprising:

a predominate <220> crystallographic texture across the sputtering surface; and an average grain size across the sputtering surface of less than or equal to about 30 microns, wherein any precipitates present in the target have a maximum dimension of 0.5 micron, the material being formed by a process including casting.

68. (Amended) The physical vapor deposition target of claim 67 further comprising ~~one or more~~ at least one element selected from the group consisting of aluminum, silver, and gold.

Claims 82 and 83 are cancelled.

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